Aspen
Greenhouse Gas Emissions Inventory, 2007

AN UPDATE TO THE 2004 BASELINE

CITY OF ASPEN CANARY INITIATIVE

and CLIMATE MITIGATION SERVICES

May 2009

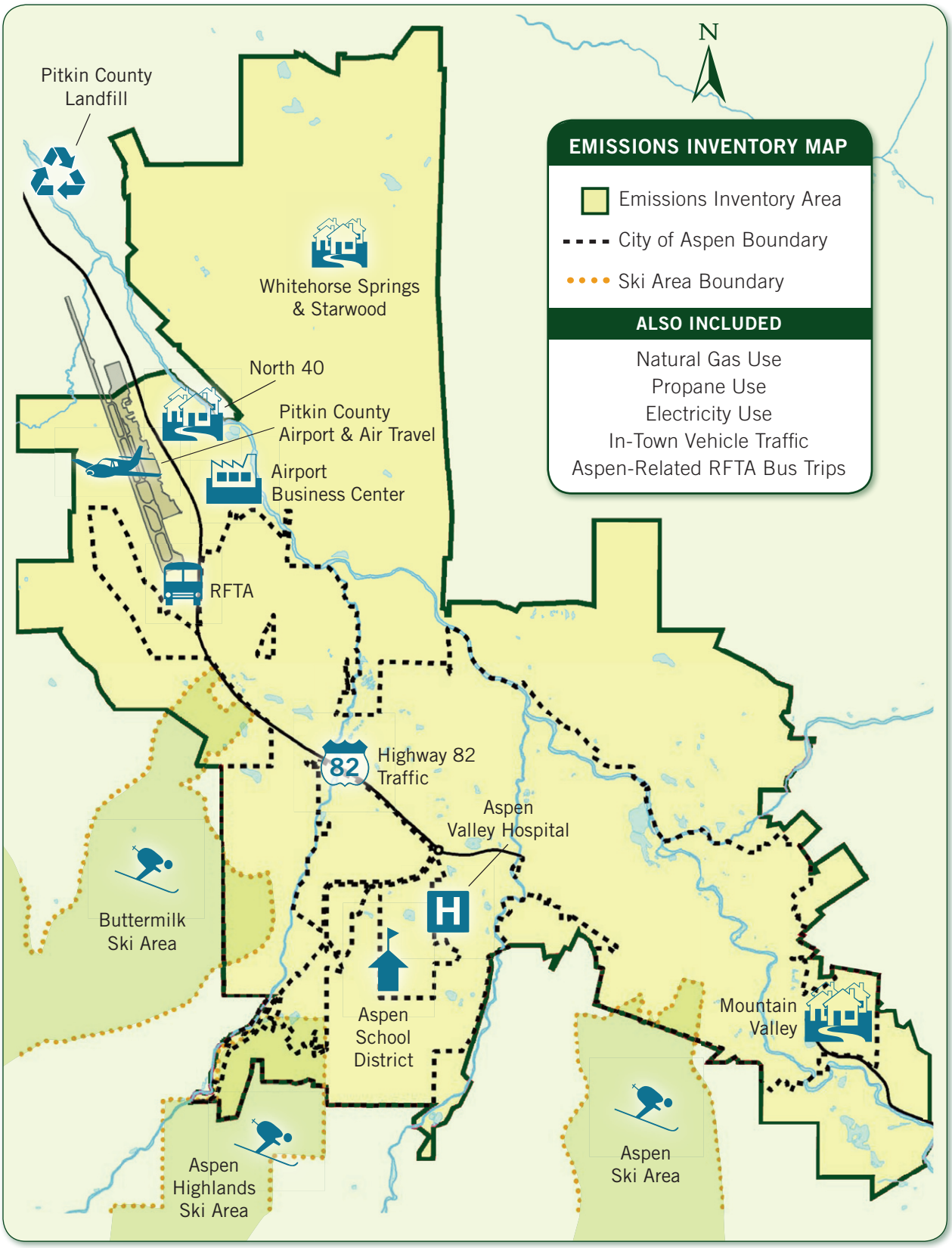

Figure ES-2. Geographic emissions boundary

TRANSPORTATION

The *Transportation* sector comprises 63.2 percent of Aspen's total emissions, emitting 480,378 tons CO_2e through the combustion of 46.8 million gallons of gasoline, diesel, and jet fuel. This is a decrease of 11.7 percent compared to 2004 **(Figure 15)**.

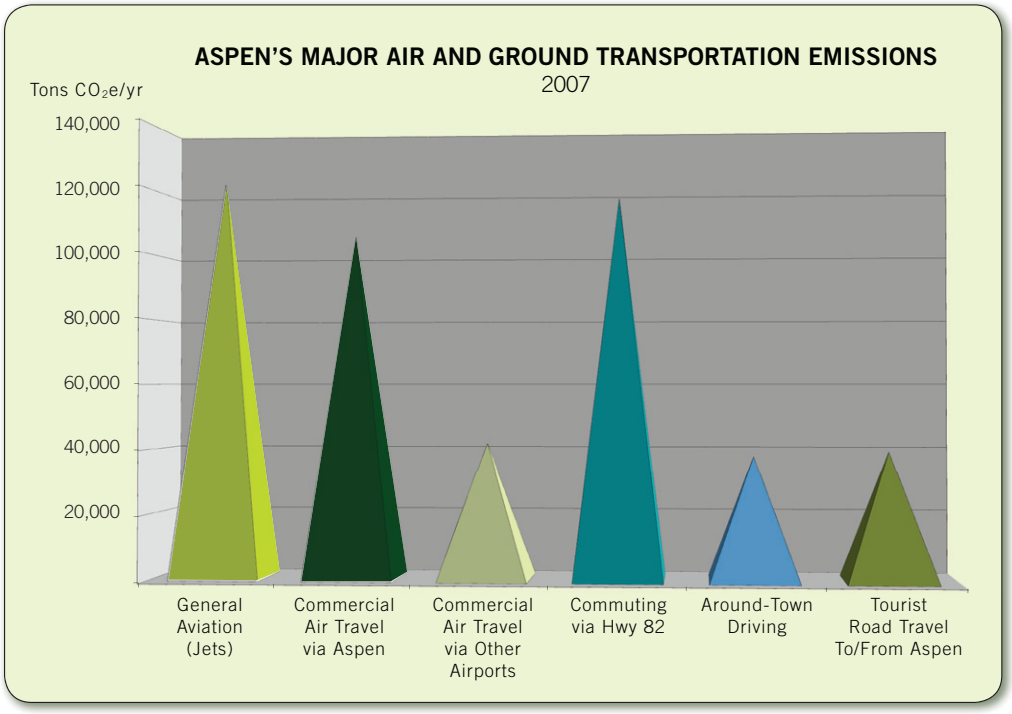

Figure 14. Transportation emissions

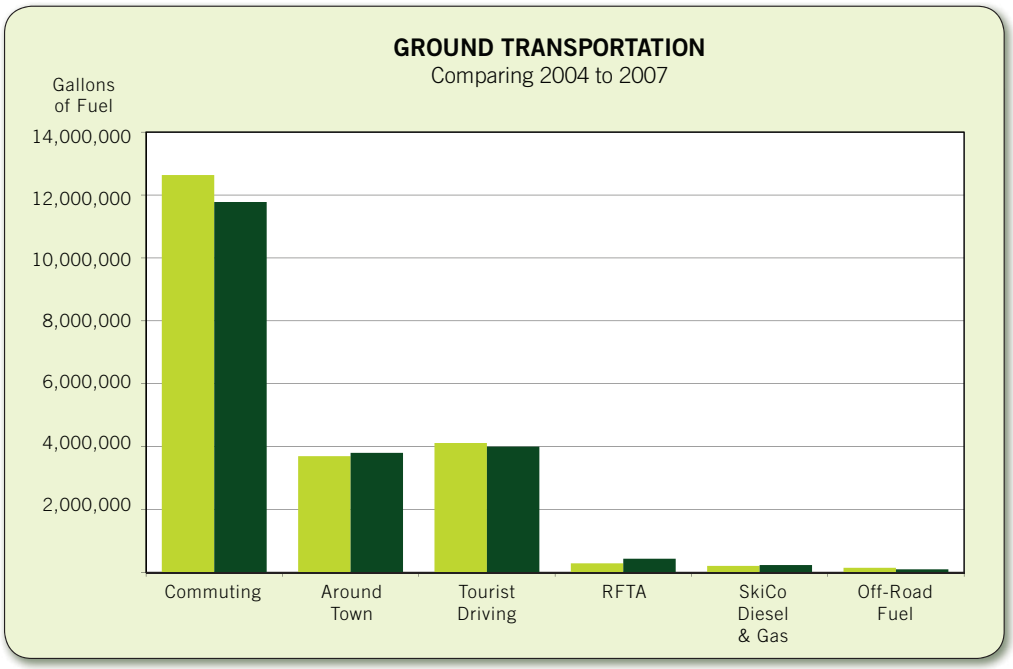

Figure 15. Ground transportation emissions 2004 versus 2007

Transportation is divided into two main categories: Ground Transportation and Air Travel & Aviation. From 2004 to 2007, Ground Transportation emissions decreased 3.6 percent, equivalent to 7,700 tons CO_2e **(Figures 15, 19)**. Air Travel & Aviation emissions decreased by 16.7 percent — a drop of 55,700 tons CO_2e (equivalent to 2,183 average Aspen homes) **(Figure 16)**. Ground Transportation emissions comprise 42.4 percent of the total emissions from the *Transportation* sector (26.8 percent of Aspen's total).

Ground transportation. Emissions from ground transportation include Highway 82 commuting fuel and emissions (inbound and outbound traffic), tourism travel, driving around town, RFTA buses (in-town and valley routes), construction vehicles, school buses, City and County vehicles, and other fuel use within or attributable to Aspen, such as Aspen Skiing Company,[47] construction equipment, and miscellaneous off-road vehicles such as snowmobiles and yard equipment. Emissions are calculated on the basis of fuel consumed in each sector, and exclude upstream emissions.[48]

Air travel & aviation. Emissions from air travel include both directions of travel at the Aspen-Pitkin County Airport for both commercial and private planes, as well as a portion of commercial travel at nearby airports including Eagle/Vail, Grand Junction, and Denver.

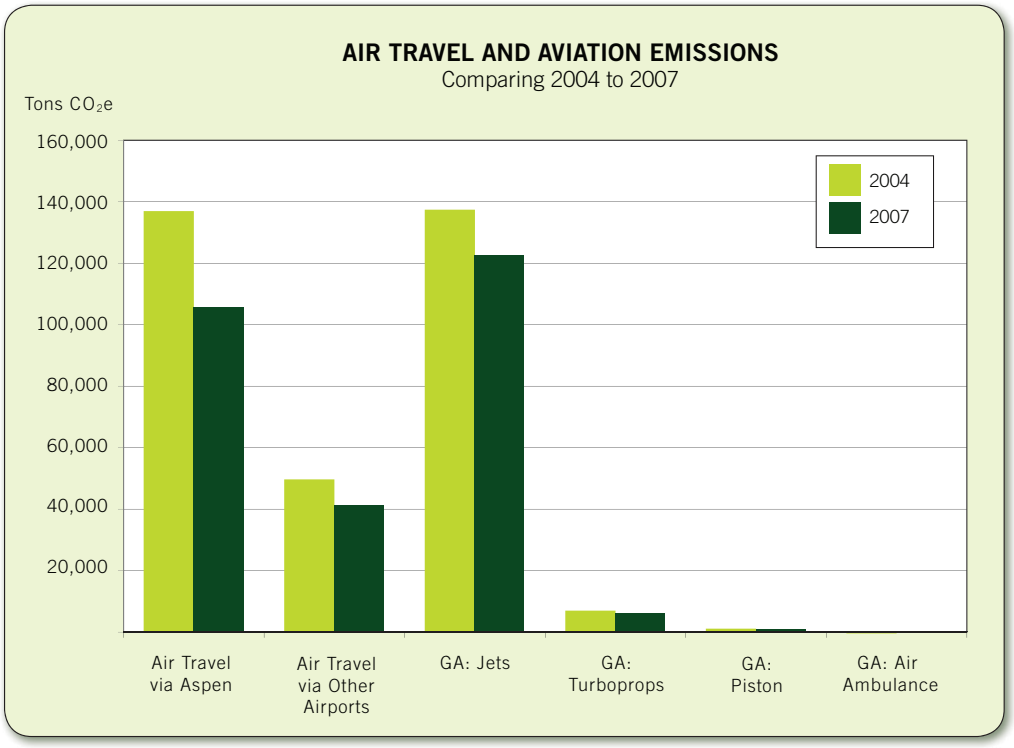

Figure 16. Air travel emissions 2004 versus 2007

47 Snowmass is outside of the Emissions Inventory Boundary. Fuel for snowmobiles and groomers at Aspen Mountain, Highlands, and Buttermilk is included.

48 We have not estimated emissions from the production, refining, storage, and distribution of liquid fuels. Such "wells-to-tank" emissions add 19 percent (diesel) to 27 percent (gasoline) to the fuel combusted by consumers — *not* including the emissions from energy used by service stations. Nor are the upstream emissions from the fabrication of mega-tons of steel, concrete, and other resources embodied in the oil and fuel-delivery infrastructure.

Ground Transportation

Highway 82. In 2007, 57.6 percent of Ground Transportation emissions (15.5 percent of Aspen's total emissions) were from private and commercial vehicles traveling on Highway 82. Highway 82 traffic consumed 11.8 million gallons of fuel, a 6.8 percent decrease over 2004's total of 12.6 million gallons **(Figure 17)**.

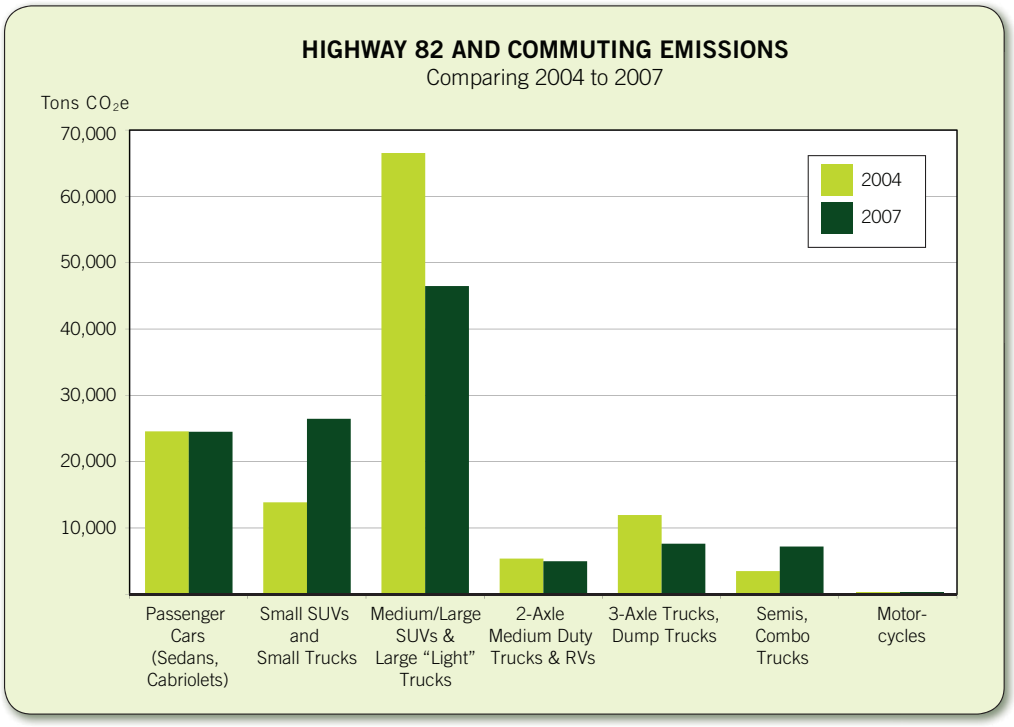

Figure 17. Highway 82 and commuting emissions

Transit buses. The amount of fuel consumed by RFTA buses (and allocated to Aspen) increased to 439,040 gallons of diesel fuel, a 50 percent increase in fuel use (up from 291,989 gallons in 2004). Most of this difference is attributable to better data which allocates a higher percentage of valley riders to Aspen. In 2007, 2.2 percent of Ground Transportation emissions (0.6 percent of Aspen's emissions) were from RFTA transit buses, with emissions from buses totaling 4,395 tons of CO_2e, an increase of 1,256 tons CO_2e. This increase is somewhat mitigated by RFTA's higher usage of biodiesel, which increased from 5 percent to 13.4 percent biodiesel averaged over each year's total fuel consumption **(Box 4)**.[49]

49 Nearly all of the increased fuel consumption and emissions is due to revising the RFTA methodology. CMS, in consultation with Dan Blankenship, attributed 71.6 percent of RFTA's valley routes to Aspen (compared to 39.1 percent in 2004). While CMS did not revise the 2004 Inventory, a re-calculation shows that RFTA's fuel use was 417,212 gallons and emissions totaled 4,486 tons CO_2e – or a decrease of 90 tons CO_2e in 2007, chiefly due to the agency's higher use of biodiesel in 2007.

Transportation:

BUS RIDERSHIP ON THE RISE... AND GREENER

In 2007, the Roaring Fork Transportation Authority (RFTA) kept 961,130 gallons of gasoline from being consumed – an emissions savings of 9,416 tons CO_2e, or 28 percent over 2004. RFTA operations avoid fuel use by keeping bus riders from using personal vehicles. Every ton of emissions by a RFTA bus avoids 2.1 tons from personal vehicles.

Bus ridership increased in 2007 by 8.2 percent over 2004, with 3.5 million passengers using the service to get around town and into and out of Aspen. RFTA also greened its fleet, increasing its fleet of hybrid buses to 11 by the end of summer 2007.

BEYOND 2007… By 2013, RFTA will have expanded its service significantly — adding more bus-only lanes, increasing its service, and implementing intelligent-transportation systems, through the Regional Bus Rapid Transit project. In 2008, one phase of the project was completed, with the construction of new bus-only lanes between Aspen and the Aspen Airport Business Center.[1] The improved transit system likely will reduce emissions from the *Transportation* sector in the Aspen area as well as the Roaring Fork Valley.

Also, in 2008, RFTA and the City of Aspen teamed up to retrofit six in-town shuttle buses with lower-emission diesel engines. Per vehicle, the retrofits decrease particulate-matter pollution by about 90 percent, carbon-monoxide pollution by about 75 percent, and hydrocarbon pollution by about 85 percent – improving air quality significantly.

1 Source: http://www.rftabrt.com (accessed 16 Mar 09)

Box 4. Transportation

Around town. Around-town traffic comprised 18.5 percent of Ground Transportation emissions (5 percent of Aspen's total emissions), and consumed 3.8 million gallons of fuel, an increase of 2.9 percent (up 106,000 gallons from 2004). Around-town emissions totaled 37,713 tons of CO_2e, up 2.7 percent from 2004.

Emissions calculation: Highway 82 & around town. Highway 82 emissions and around-town driving emissions are based on (a) the traffic counter at Castle Creek Bridge (which counted 8.15 million vehicles crossing the bridge in both directions in 2007, down from 8.59 million vehicles in 2004), (b) a vehicle-miles-traveled (VMT) estimate generated by the Colorado Department of Public Health, which was included in a particulate pollution report on the City of Aspen (for driving around town), (c) conservative estimates of miles per trip for commuting on Highway 82, and (d) a vehicle-type survey performed for this analysis.[50] Vehicles entering and driving around Aspen were assigned fuel economy averages (e.g., 7.4 mpg for heavy trucks, 17 mpg for large SUVs, and 22.1 mpg for passenger cars) to generate fuel and emissions estimates **(Figure 18)**. There was a slight increase in the composite fuel efficiency of the vehicles driving around town and commuting – from 18.6 mpg in 2004 to 19.2 mpg in 2007.

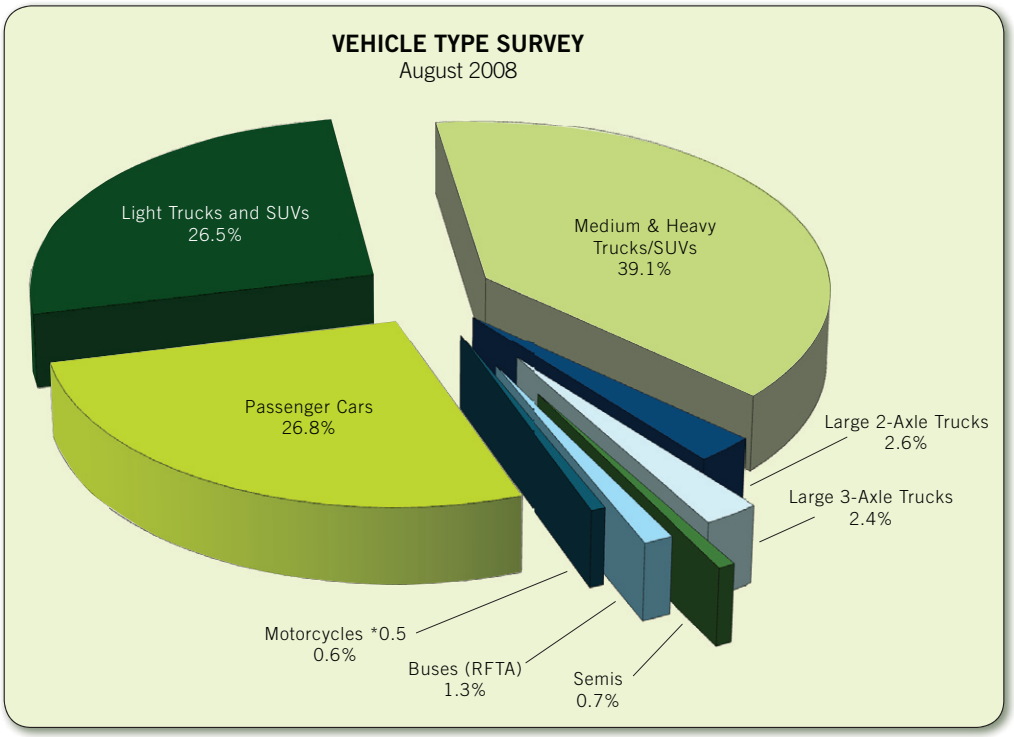

Figure 18. Vehicle type survey

50 Castle Creek Bridge traffic counts from John Krueger (City of Aspen Transportation Department). Colorado Dept of Public Health (2000) *PM10* report. Vehicle-type survey conducted at Maroon Creek Bridge on Highway 82 and at the intersection of Cemetery Lane and Power Plant Road in Aspen.

Tourism. Tourist traffic contributed to 19.3 percent of Ground Transportation emissions (5.0 percent of Aspen's total). Tourist traffic consumed 3.8 million gallons of fuel, down 2.8 percent from 2004 (a drop of 115,200 gallons). Emissions from the category totaled 39,211 tons CO_2e in 2007 (equivalent to 1,537 Aspen homes).

Emissions calculation: Tourism. Fuel consumed by tourists driving to Aspen is based on (a) the fraction of Aspen visitors driving (rather than flying) to Aspen, (b) the town's available "pillows," (c) monthly occupancy rates, and (d) survey data regarding originations. An average driving distance of 600 miles roundtrip and 350 cars arriving in town daily were used in the calculation.[51] About 4 million gallons were consumed by driving attributed to tourism. The fuel consumption accounts for about 76.7 million vehicle miles traveled by 127,750 drivers in transit to and from Aspen in 2007. Tourism driving is in addition to the around-town and Highway 82 driving discussed above.

Based on our vehicle survey and estimated travel patterns, total CO_2 emissions for Highway 82 driving by vehicle type is shown in the figure below **(Figure 19)**.

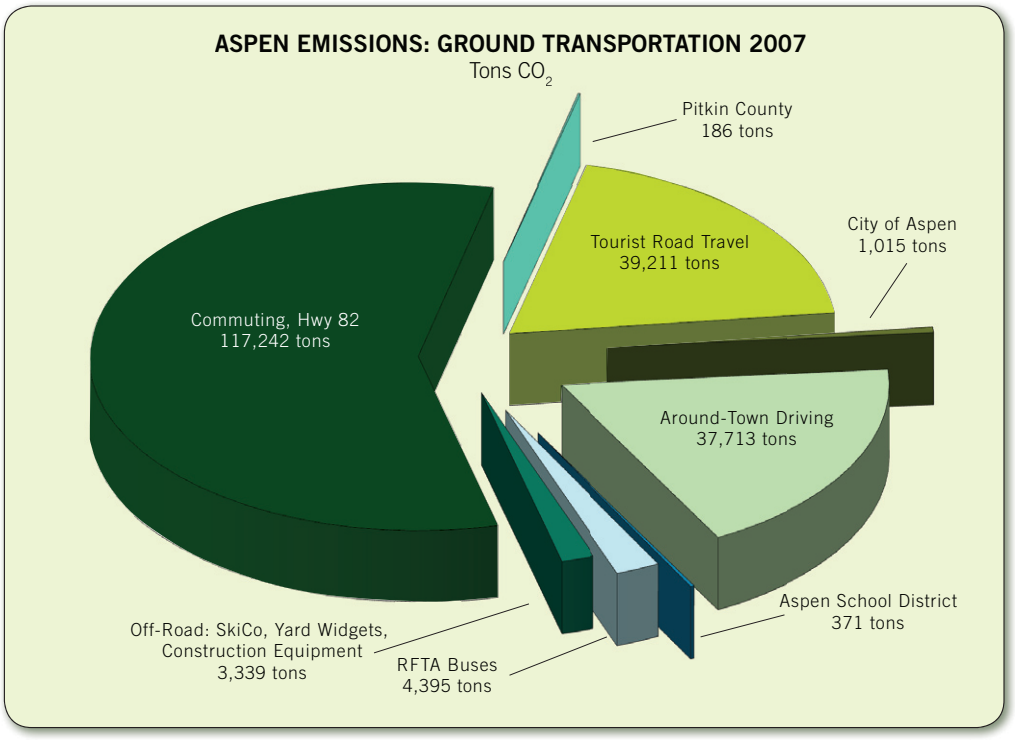

Figure 19. Ground Transportation 2007

51 Using data supplied by Aspen Chamber Resort Association. ACRA data show that four in ten summer visitors fly to Aspen (vs ~20 percent in winter); one-third are from Colorado, 8 percent from California, 6 percent from Texas, 5 percent from Florida, and so forth. Aspen has ~7,000 pillows, average summer occupancy is ~70 percent and the average length of stay is 1.9 days in May and 2.7 days in July. See the "Road Vehicles" worksheet in Appendix C for data and methodologies.

Other ground transportation. Aspen School District buses and other school vehicles used 35,000 gallons of fuel and emitted 371 tons CO_2 (0.18 percent of Ground Transportation emissions / 0.05 percent of Aspen's total). City of Aspen vehicles used 95,400 gallons and contributed 1,015 tons CO_2 (0.50 percent of Ground Transportation / 0.13 percent of Aspen's total emissions); Pitkin County vehicles consumed 17,700 gallons of fuel and emitted 186 tons CO_2 (0.09 percent of Ground Transportation / 0.02 percent of Aspen's total emissions).[52] The Aspen Skiing Company consumed 237,350 gallons of diesel and gasoline, emitting 2,263 tons CO_2 (1.1 percent of Ground Transportation / 0.30 percent of Aspen's total emissions). Off-road and miscellaneous vehicles and uses[53] consumed 101,600 gallons of fuel and contributed 1,047 tons CO_2 (0.51 percent of Ground Transportation / 0.14 percent of Aspen's total emissions).

Air Travel & Aviation

Air Travel & Aviation accounts for 58 percent of the emissions from the *Transportation* sector (36.4 percent of Aspen's total), emitting 276,907 tons CO_2e, a decrease of 16.7 percent from 2004's total of 332,247 tons CO_2e. General aviation comprises 47 percent of Air Travel emissions; commercial air travel contributes 53 percent **(Figure 16, 20)**.

The decrease in Air Travel emissions is, in part, a result of the change in calculation methodology with regard to dividing air travel into distance segments: regional short-haul flights, domestic flights, and international flights (see *Changes to Methodology*). While this accounting change is an improvement, it also reduces emissions over what the estimate would have been without the change. Also playing a role in the decrease was 2007's two-month closure of the Aspen-Pitkin Country Airport from April 9 to June 7. The impact of the runway closure as reduces emissions by about 8.5 percent of total air travel via Aspen, which is equivalent to about 9,045 tons CO_2e.[54] A similar calculation has not been made for the impact of the closure on general aviation operations and emissions, nor do we know whether those "missing" travelers simply flew to Eagle or elsewhere instead, or delayed their trips and came later in the year.

This inventory excludes the additional climate impact of the fuel combustion emissions and vapor trail formation of commercial and general aviation operating at high altitudes. This "radiative forcing" (CRF) factor is excluded in accordance with IPCC, EPA, WRI, and similar inventory protocols, although many air travel calculations do include RF "emissions."[55]

52 The inventory allocates 20 percent of Pitkin County's gasoline and diesel consumption to Aspen for snowplows, Sheriff, dump trucks, road maintenance vehicles, runway plows and sweepers, etc.

53 Not included in off-road and miscellaneous vehicles are ambulances and Aspen Skiing Company vehicles.

54 Apr-Jun total passenger enplanements and deplanements totaled 60,292 in 2006 and 73,211 in 2008, and 35,851 in 2007 (the airport was open part of Apr07 and most of Jun07). If we normalize Apr-Jun07 to the average of Apr-Jun06&08, we'd expect an additional 30,901 passengers — if the airport was not closed. This adds 8.55 percent to the air travelers via ASE in 2007, and 105,750 tons CO_2e x 0.085 = 9,045 tons CO_2e.

55 The Canary Initiative air travel calculator (www.aspenzgreen.com/offsets_calculator_air.cfm) includes an option for air travelers to voluntarily add an RF factor to their total air travel estimate. CMS has reviewed the recent science (Samsen, et al., (2005) and Wuebbles (2006)) and estimates an RF factor of 88.9 percent above combustion of jet fuel.